

# A Primer on Inspecting Stormwater Control Measures



## SCM FUNCTION



# SCM Function



- SCMs are designed to be a stormwater management feature, not landscaping feature

They:

- Retain stormwater onsite to control runoff and reduce flooding
- Improve water quality by removing sediment and associated pollutants from stormwater (Oil and Grease, Nutrients, Heavy Metals, Pathogens)
- Promote stormwater infiltration into ground and replenish groundwater supply

# SCM Design



- SCMs are usually designed by licensed engineers
- Specialized consideration is given to:
  - Watershed size
  - Choice of SCM depending upon site conditions, available space, and target pollutants
  - Soil type
  - Underlying geology

# SCM Installation



- Installed by grading and/or landscaping contractors
- It is crucial that the installer fully understands why the SCM is being installed and how it will work!



## **Building Better Bioretention: Lessons Learned from Failing Bioretention**

**Name that SCM!**



**Construction Problem #3**  
Choose the right filter media.



**Construction Problem #1**  
Soil Compaction



**Construction Problem #4**  
Choose the right mulch!



**Construction Problem #2**  
Filter fabric choice



**Construction Problem #5**  
No EPSC during construction



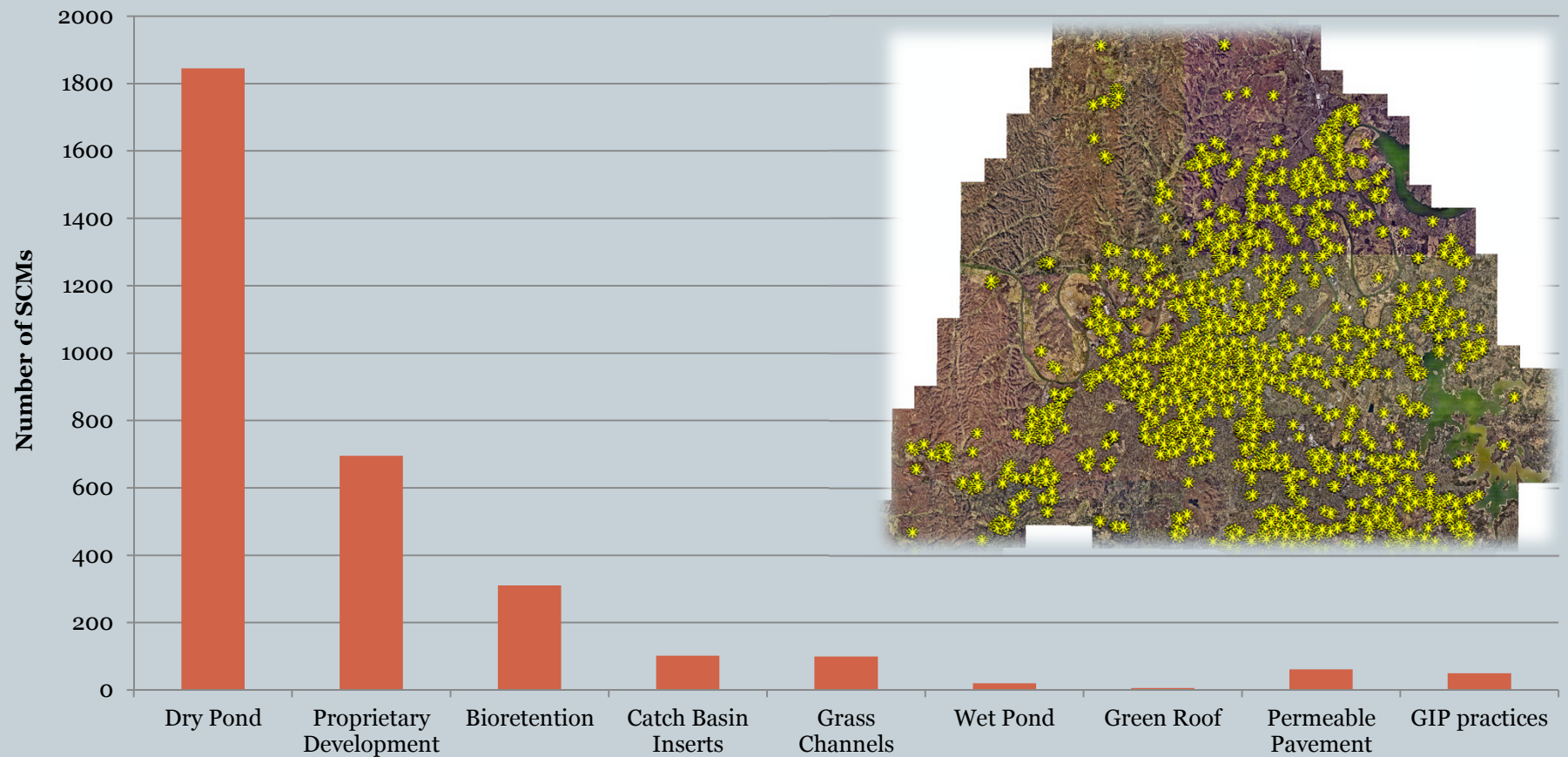
# SCM Maintenance – The Why



- **Function:** SCMs are under constant load and need maintenance to treat pollutants.
- **Drainage:** They usually are the only means of drainage in the landscape.
- **Safety:** They may pose a safety hazard if not maintained.
- **Legal requirements:** They are required by law in many jurisdictions.
- **Investment:** Most landowners want a return on investment.
- **Aesthetics:** They are usually part of the landscape.



# Regulatory SCMs in Nashville (2/2015)



# SCM Function



## 7 most common SCMs found in Nashville

- Dry Detention Pond
- Water Quality Unit
- Bioretention
- Catch Basin Inserts
- Grassed Swale or Channel
- Permeable Pavement
- GIPs (Green Infrastructure Practices- SWMM Vol 5)

# Retention Pond Function

- Designed to store and slowly release stormwater
- Limited removal of sediment, TSS, nutrients
- (Landscape feature)
- Retention vs detention!





# Dry Detention Pond



- Designed to *temporarily* store and slowly release stormwater
- Removal of sediment, TSS, nutrients with a low-flow orifice at outlet

# Grassed Swale

- Slow down and spread water flow



- Facilitate filtration, infiltration, and limited nutrient uptake





# Bioretention



- Infiltrate runoff
- Slow runoff
- Pollutant removal
  - Plant uptake
  - Microbial action
  - Filtration
  - Sedimentation
  - Sunlight
- (Aesthetic amenity)



# Infiltration Trench

- Reduce runoff volume through infiltration



- Remove pollutants by filtration



# Permeable Pavement

- Infiltration
- Pollutant removal through filtration





# Green Roof

- Reduce volume by capturing rainwater on roof with plantings
- Reduce heat-island effect
- Overflow downspouts when it reaches capacity



# Water Quality Unit



- Filter stormwater runoff
- Separate and contain sediment, oil and grease, litter



# Catch Basin Inserts

- Filter stormwater runoff
- Separate and contain sediment, litter





# A Primer on Inspecting Stormwater Control Measures



## SCM INSPECTIONS: A GENERAL FRAMEWORK



# SCM Inspections



- Can use this general framework for all SCMs
- Follow the water and ask:
  - Is the water **flowing in** where it was designed to flow (look at the plans)?
  - Is it **leaving** the SCM as designed (think process and timing?)
  - Are there any **safety** issues?
  - Does the practice “**look good**”? Is there **obvious damage**?

# SCM Inspections

- So, inspect the:

- Inlet
- Flow path
- Outlet
- Upstream watershed
- Downstream receiving drainage
- Vegetation

(Consult planting plans for bioretention areas!)





# SCM Inspections



- What to look for at each of the inspection points:
  - **Signs of erosion** (sediment leaving rather than staying in the SCM)
    - ✦ Water entering the SCM too fast or creating preferential flow paths (rills and gullies)
    - ✦ Inadequate vegetation

# SCM Inspections- Erosion



Check for erosion at inlet,  
outlet, on berm, along flow path

# SCM Inspections - Sediment



- What are you looking for?

- Sediment deposits

- ✦ Look for it at the inlet and outlet
    - ✦ Look for fine-grain sediment filling in spaces between river rock/ riprap set up to slow down the water

## Found sediment deposits?

- ✦ **Congratulations!** Your SCM is functioning correctly!
  - ✦ Now it needs maintenance to remove the deposited soils/ debris...



# SCM Inspections



Inspect during rain to see the impact on SCM function/ how water flows through the system



# SCM Inspections



- What are you looking for? (ie: Goldilocks...)
  - Overgrown/ too much vegetation
    - ✦ Can lead to erosion around root wads
    - ✦ Can block outlet orifice
    - ✦ Safety issue (attracts animals and suspect characters)
    - ✦ Doesn't "look good"
  - Not enough vegetation = exposed soil and erosion
    - ✦ Grass cut too short
    - ✦ Not enough grass
    - ✦ Not enough bioretention plantings (Follow plans!)
    - ✦ Doesn't "look good" either.



# SCM Inspections



# SCM Inspections



- What are you looking for?
  - Upstream Watershed/ Contributing drainage area
    - ✦ Is it stabilized?
    - ✦ Is the upstream watershed “dirty” and contributing excess sediment or trash to the practice? (might require more frequent I&M)
  - Downstream/ Receiving drainage
    - ✦ Check for signs of erosion, sediment deposits
    - ✦ Discharge should be diffuse and not creating gullies

# SCM Inspections



- Proprietary Devices/ Water Quality Units
- Catch Basin Inserts
- Follow the water through the system = know your system, so...

**Consult Manufacturer's Recommendations!**



# SCM Inspections



Wal Mart Market

- Check concrete structure for obvious cracks/ chipping
- Trash Rack
- Baffles in place
- Filter Cartridges/ Media

# SCM Inspections



- Sediment depth- you will need a Sludge Judge
- Is discharge point stable?
- **CONFINED SPACE ENTRY SAFETY –**  
(You are responsible for ensuring all OSHA/TOSHA compliance.)



# SCM Inspections



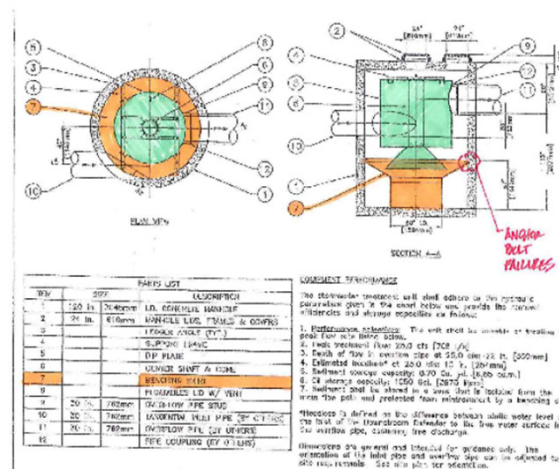
- How do you know when to address an issue?

Answer: ASAP or before the next rain to promote SCM effectiveness. (Sooner is cheaper!)

But do consider growing seasons, rainy/dry seasons, manufacturer's recommendation (for WQUs).

Early and frequent maintenance will prolong the life of the SCM.  
A cautionary tale...

# SCM Inspections



Henry Hale Homes WQ Unit #4 Repair February 26, 2014

~\$1000/yr annual maintenance vs \$24,000+ no maintenance and remedial rebuild



# A Primer on Inspecting Stormwater Control Measures



**5 MINUTE BREAK**

**REVIEW NEW CHECKLIST**

**PLAY VIRTUAL SCM INSPECTIONS:**

**NAME THE PROBLEM!**



# SCM Inspection Checklist



Metropolitan Nashville - Davidson County  
Stormwater Management Manual  
Volume 1 - Regulations

March 2015

## Metro Nashville Stormwater Control Measure (SCM) Inspection Report

### SCM Site Information

Grading Permit Number	
Site Address	
Owner/ Responsible Party Name	
Owner Contact Phone	
Owner Contact Email	
Date of LAST inspection	

### Inspector Information

Date of CURRENT inspection	
Name of Inspector	
Are you a third party inspector?	Y / N If Yes, company contact :
Are you a Qualified Professional SCM Inspector?	

### Document Review

Review associated documentation for the SCM, noting any differences with what you find on site.

Long Term Maintenance Plan: Reviewed Y / N \_\_\_\_\_

As-built plans: Reviewed Y / N \_\_\_\_\_

Landscape planting plans, if needed: Reviewed Y / N \_\_\_\_\_

Last inspection report: Have previously noted maintenance needs been addressed? Y / N \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_



Metropolitan Nashville - Davidson County  
Stormwater Management Manual  
Volume 1 - Regulations

March 2015

## SCM Inspection Checklist

Complete one checklist per stormwater control measure. Submit checklists per site.

SCM TYPE: \_\_\_\_\_  
(dry detention pond, wet detention pond, bioretention/rain garden, grass channel, water quality swale)

Date of Last Rain: \_\_\_\_\_

Please note whether feature is satisfactory, maintenance needed, unsatisfactory / non-functioning. Clarify with your own comments. Note locations of photographs.

Inspection Key S=Satisfactory: Feature is functioning as designed; M= Maintenance needed: Feature has mild to moderate routine maintenance needs, but is still functioning; U= Unsatisfactory: Feature requires immediate major remedial maintenance to restore function; N/A= Feature does not apply



Feature	S-M-U Rating	Comments
Inlet structure/headwall stable?		
Inlet sediment accumulation or erosion?		
Flow path vegetation per plans?		
Flow path bare soil/erosion?		
Banks/ Perimeter stable?		
Outlet Structure stable?		
Outlet orifice blocked?		
Outlet sediment accumulation or erosion?		
Emergency Spillway: stable?		
Stormwater: Detention volume		
Stormwater: Infiltration rate		
Underdrain Cleanout		

General Comments:

\_\_\_\_\_

\_\_\_\_\_

Date of Next Inspection: \_\_\_\_\_

Inspector's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

# SCM Inspection Checklist



## ***Inspection Key : S-M-U Rating***

*S= Satisfactory:* Feature is functioning as designed

*M= Maintenance needed:* Feature has mild to moderate routine maintenance needs, but is still functioning

*U= Unsatisfactory:* Feature requires immediate major remedial maintenance to restore function

*N/A=* Feature does not apply

# SCM Inspections



Think water flow and function, safety, aesthetics.

Think inlets, flow path, outlet, contributing and receiving drainage areas

Look for erosion, sedimentation, vegetation growth.

(Talk about trees in dry ponds)



# Virtual Inspection





# Virtual Inspection





# Virtual Inspection





# Virtual Inspection





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# Virtual Inspection





# Virtual Inspection



# Virtual Inspection





# Virtual Inspection



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# Virtual Inspection





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# Virtual Inspection





# Virtual Inspection



# Remember...



- An inspection is a documentation of observations. The inspection report can recommend maintenance and still be submitted. (Repairs don't need to be complete before submission to NPDES.)
- A good inspection compares what was on the plans to what is on the ground (what should be vs what is)
- Regular/Routine maintenance does not require re-engineering a practice (i.e.: mowing, weeding, dry sweeping sediment at inlet, replanting).
- Know your limits. If you are not an engineer, you should not be recommending remedial “engineered fixes...”; you should suggest the owner get an engineer.

# Remember...



- Think water flow and function, safety, aesthetics.
- Look at inlets, flow path, outlet, contributing and receiving drainage areas.
- Look for erosion, sedimentation, vegetation growth.
- Know when to recommend Routine vs Remedial maintenance and the expertise required for each.

# Remember...



- For Metro's annual inspection report submit:
  - Inspection checklist
  - Photographs
  - Copy of waste manifest if WQU is pumped out
- Email to: [SCM@nashville.gov](mailto:SCM@nashville.gov) or,
- Mail to: 1607 A County Hospital Road  
Nashville, TN 37218
- Questions about a site? CALL us at 615-880-2420!
- [www.nashville.gov/Water-Services/Developers/Post-Construction.aspx](http://www.nashville.gov/Water-Services/Developers/Post-Construction.aspx)



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**FIELD TRIP:  
PERMEABLE PAVERS  
BIORETENTION**



